

REMARKS

Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Claims 1-12 remain pending. Claims 13-18 are added and find support in the application as filed, for example, page 4, lines 7-10 and lines 13-22; and page 6, lines 1-3.

Claims 5, 8, 9 and 10 are amendment to provide the "clarity" required to overcome the indefiniteness rejections by providing appropriate antecedent basis or removing the need therefore. No change in scope and no new matter is inserted and no new issues are raised.

Accordingly, the rejection under 35 USC 112, second paragraph, is respectfully traversed.

The rejection of claims 1-12 under 35 USC 103(a) as unpatentably obvious over Gattuso, US 4,734,540, ('540), is respectfully traversed for the following reasons.

As noted from the specification and pending claims, the present invention provides an improved process for hydrogenating phenyl acetylene in a styrene-containing medium. The process utilizes a supported nickel catalyst having a nickel content of from 11-25 wt.%.

While the disclosure of '540 includes general descriptions of polyunsaturated hydrocarbons, inclusive of phenyl acetylene, there is no specific description, as recognized by the Examiner, of phenyl acetylene in a styrene-containing medium nor is there any specific examples showing the hydrogenation of aromatic polyunsaturated hydrocarbons. In the only working example, diolefinic hydrocarbons in a feed stream comprising an admixture of paraffinic and olefinic hydrocarbons (see, col. 8, lines 46, et. seq) are hydrogenated. Only about 0.99 vol.% of the feed stream was aromatic (col. 8, lines 57-58).

In the present invention, as seen from the working examples, excellent selective hydrogenation of the phenyl acetylene is achieved using the supported nickel catalyst without further modifying component.

However, according to the disclosure of '540 it is essential that small amounts of sulfur also be present in or on the supported nickel catalyst.

It would not have been obvious or expected that the supported nickel catalyst in the process of the present invention would remain effective for upwards of 100 to 200 days or more, without adversely or substantially adversely effecting the hydrogenation activity and, then, relatively easily regenerated. The disclosure in '540 (see Figs. 1 and 2) shows activity for less than 120 hours (measured starting from 552 hours on-stream). Therefore, including the on-stream time, the patentees only show performance of the catalyst for less than 30 days.

Nor do the patentees suggest that the catalyst, after decline in activity, may be easily regenerated.

From Fig. 1 of '540 it is seen that the hydrogenation of diolefins resulted in a decrease from a starting amount of 2.09 vol.% (col. 8, lines 62-63) whereas the reaction product still contained from about 1.2 to about 1.6 vol.% of diolefins.

For the monoolefins, the results for the different Ni supported catalysts varied widely with "A" showing an increase of the starting amount (11.46%) to values above and below 13%, with "B" and "C" producing substantially less monoolefins.

This difference is manifested by the observation that according to '540 it is acceptable that the amount of polyunsaturated compound in the reaction product is less than 1000 ppm (col. 4, lines 48-53) whereas, in the present invention, substantially lower levels of phenyl acetylene (higher hydrogenation activity) is required. For example, as set forth in new claims 17 and 18, phenyl acetylene content in the styrene-containing medium is reduced to less than 100 ppm, preferably less than 10 ppm.

Another difference between the process of the present invention and the preferred process described in '540, is the temperature of the hydrogenation reaction. In the present invention the reaction temperature is preferably below about 50 °C (see, e.g., claim 8) to prevent polymerization of styrene. In contrast, according to '540, the reaction temperature is preferably substantially higher, e.g., about 200 °C in the example in col. 8. As disclosed at col. 4, lines 20-22, the temperature is at least 50 °C.

Therefore, in view of all of the above differences, the process as disclosed and claimed herein would not have been obvious over '540.

In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Attached is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned "Version with markings to show changes made".

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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Enclosure: Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE
IN THE CLAIMS:

5. (Twice amended) Process according to claim 1, wherein the styrene-containing medium and the hydrogen gas are supplied at the bottom of [the] a reactor.

8. (Twice amended) Process according to claim 1, wherein hydrogenation is carried out at a [the] temperature [is] between 15 and 50 °C.

9. (Twice amended) Process according to claim 1, wherein hydrogenation is carried out at an [the] LHSV between 0.1 and 100 per hour.

10. (Twice amended) Process according to claim 1, wherein hydrogenation is carried out at an [the] LHSV between 0.1 and 10 per hour.

Claims 13-18 are added.

End of Appendix